

# Aurora Program - Ongoing Project Status

September 23, 2011

## **FY 2000 through FY 2007**

- 2000-01: Benchmarking of RWIS Forecasts (\$50,000 in-kind) = 75% complete
- 2006-01: Support of the Clarus Initiative (\$25,000) = 90% complete
- 2007-01: RWIS Equipment Monitoring System, Phase 2 (\$135,000) = 5% complete
- 2007-02: Cold Weather Testing of the Halliday Road Grip Unit (\$40,000) = 90% complete
- 2007-04: Development of a Freezing Drizzle Algorithm (\$85,000) = 70% complete
- 2007-05: Multiple-Use ITS Data Collection Sites (\$15,000) = 15% complete

## **FY 2008**

- 2008-01: National Road Weather Testing Program (\$11,000) = 20% complete
- 2008-03: Next Generation RWIS for Canada (\$75,000 in-kind) = 75% complete

## **FY 2009**

- 2009-01: Summary and Comparison of Sensors (\$55,000) = 20% complete
- 2009-04: Road Weather Education Enhancements (\$20,000) = 30% complete
- 2009-05: Further Development of PPAES (\$83,000) = 30% complete

## **FY 2010**

- 2010-01: Enhancements of AI/RWIS CBT (\$50,000) = 25% complete
- 2010-02: Mobile-Weather Data Collection Guidelines (\$25,000) = 10% complete
- 2010-03: Development of Models for Standards (\$120,000) = 55% complete
- 2010-04: RWIS Sensor Density Grid (\$100,000) = 5% complete
- 2010-05: Determining RPU and Sensor Failure (\$5,000) = 5% complete

## **FY 2011**

- 2011-01: Third Peer Exchange (\$30,000) = 95% complete
- 2011-02: RWIS Training Tool (200,000) = 5% complete
- 2011-03: Benefit/Costs and Instruction for Migrating to Open RWIS (\$75,000) = 5% complete
- 2011-04: Study of MDSS Costs (\$20,000) = 5% complete
- 2011-05: Funding Sources Identification (\$5,000) = 5% complete

## **Project Status Report**

July 4, 2011

**Project:** 2000-01: Benchmarking the Performance of RWIS Forecasts

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**Champion:** Max Perchanok, Ontario Ministry of Transportation

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### **Status:**

- NCAR is completing surface temperature verification analyses for the Maritime Provinces and Finland, and reporting on the statistical methodology
- Data for Pennsylvania, Iowa and Alaska and Ontario were structured in a way that was not suitable for analysis.
- Jonathan Kwon from U. of Waterloo is getting up to speed to do the comparative analysis and will write the report over the summer.
- This project will become phase I of 2010-04.
- Jonathan will develop a proposal for 2010-4 for discussion over the summer and at the September Aurora meeting.

**Approximate % Complete:** 75 %

### **Barriers/Issues:**

- Pending receipt of statistical analyses from NCAR
- Suitable data available from only a few locations.

**Recommendations:**  X  continue as planned  
    continue with modifications  
    discontinue

### **Additional Comments:**

- The project is expected to be complete in late summer 2011.
- This is an in-kind project for Ontario Ministry of Transportation.
- Project Team: Max Perchanok (champion), Mike Adams, Curt Pape, Jeff Tilley, Dave Lahn, Sheldon Drobot, Dan Huang

## **Project Status Report**

December 3, 2010

**Project:** 2006-01: Support of the *Clarus* Initiative

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**Champion:** Tina Greenfield, Iowa Department of Transportation

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**Background:** *Clarus* is a FHWA initiative designed to collect, quality check, and make available via the Internet this nation's public investments in atmospheric and pavement observations which support surface transportation operations. The purpose of this project is to influence the *Clarus* initiative and assist with its early implementation through funding costs 1) for member participation in the *Clarus* project when the *Clarus* Initiative does not cover costs 2) associated with drafting and submitting a proposal to be the test location for the Multi-state Regional Demonstration.

**Strategy/Approach:** Once the system design is complete, it will be necessary to implement, integrate, and test *Clarus* in a Multi-state Regional Demonstration. This demonstration will be conducted at a selected location so that system components, core functions, and information management processes may be tested and improved. Aurora supports this initiative. Active participation in the design and demonstration phases will allow Aurora members to influence the product, gain knowledge of the details involved with implementation, and help promote this system.

**Status:**

- Proof-of-Concept test involved Aurora members UT, AK and MN.
- Iowa was awarded one of the Concept of Operations (ConOps) projects. IL, IN, and OH are Aurora members on this team. Aurora supported this application.
- Aurora agreed to fund other Aurora states participation in other ConOps projects.
- The study report for all three ConOps teams are at <http://www.clarusinitiative.org/regional.htm>.

**Approximate % Complete:** 90 %

**Barriers/Issues:** None.

**Recommendations:**     continue as planned  
                                   continue with modifications  
                                   discontinue

**Additional Comments:**

- This project was funded for \$50,000 in FY 2006.
- The project funding was reduced to \$25,000 at the September 2010 board meeting.
- Project Team: Tina Greenfield (champion), Jack Stickel, Kirk Carpenter, Dean Kernan, Mike Adams, Scott Roeder, Sheldon Drobot

## **Project Status Report**

March 10, 2011

**Project:** 2007-01: RWIS Equipment Monitoring System, Phase 2

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**Champion:** Jack Stickel, Alaska Department of Transportation and Public Facilities

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**Objective:** Expand the *RWIS Equipment Monitoring System* in four areas:

- Include in-commission rate reports with the percent of time the site was fully operational or degraded by no data received, incomplete data, or incorrect/suspicious data.
- Implement the specific changes to the RWIS Data and Reporting System proposed by the Aurora member states.
- Evaluate how site performance by sensor can be added to the application.
- Complete a Concept of Operations, system architecture, implementation plan, and deployment (assuming sufficient funding) for ingesting Clarus System quality checking output online.
- This project has also discontinued Project 2005-01: Development of a RWIS Quality Assurance Monitoring System, that was intended to develop a system that is modular to allow installation with different host organizations and platforms, expandable for incorporating additional quality assurance modules, accessible via the web, and holds historical database of quality assurance reports for future reference.

**Status:**

- The proposal will incorporate the Clarus System quality checking output for objective #4.
- A detailed analysis of the Clarus System quality checking output will be completed in May. A draft scope of work will follow.
- This project was combined with Project 2005-01.
- A mini-meeting was held at the March 2011 meeting in Boulder.

**Approximate % Complete:** 5 %

**Barriers/Issues:** Final Scope of Work for RFP

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

**Additional Comments:**

- This project was funded for \$25,000 in FY 2007.
- This project was funded for an additional \$10,000 funding under FY 2008.
- This project has been combined with Project 2005-01 and its funding of \$100,000.
- The total project budget is \$135,000 as of the September 2010 board meeting.
- Project Team: Jack Stickel (champion), Dawn Gustafson, Curt Pape, Mike Adams, Ralph Patterson, Tina Greenfield, Joe Doherty

## **Project Status Report**

May 19, 2011

**Project:** 2007-02: Cold Weather Testing of the Halliday Road Grip Unit

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**Champion:** Max Perchanok, Ontario Ministry of Transportation

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### **Status:**

- Jeff Tilley is preparing a final report for presentation at the TRB show next June in Indianapolis.
- Ohio DOT brought the RT3 unit back from North Dakota last week.
- A presentation on results will be made at the 4<sup>th</sup> National Conference on Surface Transportation Weather in Indianapolis.
- Jeff Tilley would try to send a final report to Scott Roeder prior to the Albuquerque meeting.
- Participating states gave their comments on the draft final report, and additional technical comments were anticipated after Max Perchanok's revisions.
- Max submitted comments to Jeff Tilley early in April 2009 and a portion of these requested changes would be made by early June. Some comments were beyond the scope and would need to be addressed so the two planned a call.
- Waiting to hear back from UND.
- UND had expressed some security concerns with sharing the extra data collected on this project. It was agreed that Jeff Tilley would gather this data and forward it on to Chris Albrecht where it could be accessible upon request.
- Max noted that Quebec did a friction report and that the two devices should be compared.
- The draft report is being finished.
- A mini-meeting was held Des Moines on September 21, 2010.
- Tina Greenfield sent a note to the UND contract office a few months ago about finding a successful conclusion to this project, but has not heard a response plan from UND.

**Approximate % Complete:** 90 %

**Barriers/Issues:** None.

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

### **Additional Comments:**

- This project was funded for \$40,000 in FY 2007.
- An in-kind contribution from Ontario MOT is also a part of this effort.
- Project Team: Diana Clonch (champion), Mike Kisse, Max Perchanok, Tina Greenfield, Lee Smithson

## **Project Status Report**

July 4, 2011

**Project:** 2007-04: Development and Demonstration of a Freezing Drizzle Algorithm (Phase 2)

**Champion:** Max Perchanok, Ontario Ministry of Transportation

### **Status:**

- Phase 1 was completed in October 2008. This remaining work is Phase 2.
- All project data are in hand at UND and a preliminary analysis of data was presented at an AURORA meeting in 2009. A contract extension expired at the end of March 2011.
- A contract extension was offered to UND in April and a revised version in early May under terms that will provide confidence in timely project completion by fall 2011. Principle terms of the agreement:
  - Provide a partial draft and a full table of contents for the report prior to beginning the final analysis and report writing.
  - Payment of remaining funds upon acceptance of the completed report.
- UND has not responded to the offer of extension.

**Approximate % Complete:** 70 % (Phase 2)

**Barriers/Issues:** Work from approx. October 2010 until April 2011 was deferred due to priorities of other contracts at UND. Lack of response from UND on latest offer to extend contract.

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

### **Additional Comments:**

- This project was funded for \$15,000 in FY 2007 and \$70,000 in FY 2008.
- The first phase was completed in October 2008.
- Project Team: Max Perchanok (champion), Curt Pape, Mike Adams

## Project Status Report

March 10, 2011

**Project:** 2007-05: Multiple-Use ITS Data Collection Practices

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**Champion:** Jack Stickel, Alaska Department of Transportation and Public Facilities

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### **Status:**

- The overall objective of this project remains the same – use RWIS sites for different types of data collection. The goals, however, have been slowly evolving over the past two years. The current project goal is to integrate non-intrusive traffic data collection devices into a RWIS site. There is a realization that each DOT has unique IT infrastructure, power, communication, traffic data needs, and contractual relationships. There needs to be different, specific solutions to meet these challenges. Therefore, the two goals for project are:
  - Document existing DOT programs for non-intrusive traffic data collection among AURORA states. This would include Utah, New York, and Iowa.
  - Develop a software solution for full Wavetronix integration for the SSI Linux RPU (LX-RPU). A prototype would be deployed for an AURORA state (Alaska); other AURORA states would be eligible to follow on at a reduced cost. Alaska DOT has a quote for the LX-RPU integration and is ready to go to work.
- The non-intrusive RWIS traffic integration from other states could be documented as part of Aurora Project 2009-03 “*Knowledge Base for RWIS*”.
- Other options for this project would include air quality monitoring for: Ozone O3, Nitrogen Dioxide O2, Carbon Monoxide CO, Volatile Organic Compounds VOC, Carbon Dioxide CO2, Sulphur Dioxide SO2, Hydrogen Sulphide H2S, Particulate PM10, PM2.5
- A concept of operations is pending.
- A mini-meeting was held on March 9, 2001 in Boulder.
- Chris Albrecht will compile a list of potential ideas for a state of practice review.

**Approximate % Complete:** 15 %

**Barriers/Issues:** Final scope of work for RFP

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

### **Additional Comments:**

- This project was funded for \$35,000 in FY 2007. This amount was reduced to \$15,000 at the September 2010 board meeting, with the other \$20,000 being rolled into the general fund.
- Project Team: Jack Stickel (champion), Tina Greenfield, Joe Doherty, Ralph Patterson, Curt Pape, Dawn Gustafson

## **Project Status Report**

March 2, 2011

**Project:** 2008-01: Development of a National Road Weather Testing Program

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**Champion:** Tina Greenfield, Iowa Department of Transportation

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**Objective:** The purpose of this project is to fund Aurora to market the idea of a national testing facility to various audiences and sources of support. A national facility can help states and agencies find appropriate and well-suited providers for transportation weather research.

**Status:**

- This project was first mentioned at the National Winter Maintenance Peer Exchange in Ohio in August of 2007. Other winter maintenance testing needs were also brought up in the Peer Exchange round-table discussions. These needs were assigned to AASHTO/SICOP at the December, 2007 meeting.
- After hearing support for a national facility from Clear Roads members, Tina helped arrange a conference call between champion members from Clear Roads, AASHTO, SICOP, PNS, and Aurora to discuss possible cooperation and coordination on our “national facility” projects. This group decided cooperation was beneficial and began working on a draft document describing the facility.
- The idea of a single facility morphed into the idea of a consortium or board of experts which can help requestors of research find appropriate facilities.
- Clear Roads has committed funding. The group was waiting to hear back about additional funding from PNS.
- Chris Albrecht forwarded materials concerning a testing facility database to the project team.

**Approximate % Complete:** 20 %

**Barriers/Issues:** None

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

**Additional Comments:**

- This project was funded for \$1,000 in FY 2008.
- This project was funded for an additional \$10,000 in FY 2009.
- Project Team: Tina Greenfield (champion), Jack Stickel, Max Perchanok, Lee Smithson



## **Project Status Report**

July 4, 2011

**Project:** 2008-03: MDSS Demonstration in Ontario

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**Champion:** Max Perchanok, Ontario Ministry of Transportation

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### **Status:**

- Continued work on MDSS was given strong support at MTO's Maintenance Technology Symposium and will be incorporated in the workplan for 2011-12. Pelmorex presented a short report on a Federal Prototype demonstration in Ontario and Meridian Environmental presented a report on experience with the Pooled Fund system in the U.S.
- The Pelmorex demonstration was completed at 1 site for 1 late-winter storm using U.S. Federal prototype. Comparison of the predicted mobility index with actions taken by the maintenance contractor suggest that salt use could be reduced using an MDSS. Insufficient experience was gained to conduct a benefit:cost study.
- Options under consideration:
  - Prediction of current frost potential, snow depth and mobility factor on short road segments between RWIS stations (RWIS separation in southern Ontario is 25 to 50 km)
  - Forecasts of the above up to twelve hours ahead
  - Factoring in maintenance operations and highway traffic level in addition to weather to predict road conditions.
  - What-if iterative simulator to predict how to meet winter performance standards with the least salt.
- Seasonal Load Advisory
  - A prototype system was operated this year, using the Waterloo degree day models coupled with 5 day ahead weather forecasts to predict daily subsurface temperature profiles, and the MinDoT-Lakehead cumulative freeze-thaw index model to estimate future load restriction on and off dates. Subsurface temperatures were observed at seven sites to test the models and to calibrate the TempW thermodynamic temperature profile prediction model. Observed thaw dates were closer to the observed freezing and thawing dates than were the actual dates used. (Eg, both Waterloo and MinDoT models performed well)
  - Research and modeling in the coming year will focus on calibrating the Waterloo model and the Minnesota-Lakehead model to seven different geotech profiles at the test sites, and to one other, generic profile that will be simulated using the TempW thermodynamic model.
  - Trial implementation on MTO's RWIS will continue, with additional functions to allow the user to estimate load restriction dates at non-instrumented sites using weather data from any selected RWIS site, and any of the available geotech profiles.
- Highway Planning and Design applications.(Weather Data Interface)
  - Precip sensors installed at most sites
  - Year-round data polling is in place
  - Planning is underway to define data and statistical summary needs for Construction, and Planning & Design
- Consideration will be given to linking this project with the FHWA CLARUS Use Case study.

**Approximate % Complete:** 75 %

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

**Additional Comments:**

- Funding of \$75,000 in-kind will cover Ontario's membership for FY 2008 through FY 2010.
- Project Team: Max Perchanok (champion), Curt Pape, Dawn Gustafson, Jack Stickel, Sheldon Drobot

## **Project Status Report**

September 15, 2011

**Project:** 2009-01: Summary and Comparison of Agency Experience with Sensors

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**Champion:** Dawn Gustafson, Michigan Department of Transportation

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**Objective:** The objective of this project is to develop a matrix that will summarize different agencies' experiences with sensors used in road weather information data collection.

**Status:**

- Past Actions: This project was originally established to summarize and compare the Lufft R2S and other sensors. It was determined that this evaluation can be completed as a white paper. Decision was made to move this project forward to include the creation of a matrix that will compare different sensors with different agencies' experiences.
- Lufft R2S evaluation: TBD
- Comparison Matrix: Matrix developed by Clear Roads was used to begin development of a matrix of sensors. Draft was sent to team for review and revised.
- Next Steps: Matrix was modified from comments received. A tab was added to the bottom of the spreadsheet for Sensor Types. The team will need to create a list of Sensors/Vendors that will be included in the initial deployment.

**Approximate % Complete:** 20 %

**Barriers/Issues:** None

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

**Additional Comments:**

- This project was funded for \$55,000 in FY 2009
- Project Team: Dawn Gustafson (champion), Curt Pape, Jack Stickel, Joe Doherty

## **Project Status Report**

July 7, 2011

**Project:** 2009-04: Road Weather Education Enhancements and Dissemination

**Champion:** Dawn Gustafson, Michigan Department of Transportation

**Objective:** The objective of this project is to develop methods and/or materials to disseminate existing road weather and RWIS educational materials. This project idea stemmed from the 2007 peer exchange, and it was considered to present this topic for discussion again at the 2009 peer exchange for additional input into the project's focus.

### **Status:**

- Questions that need answers
  1. What materials need to be covered by this umbrella?
  2. What materials are out there, but are difficult to access?
  3. What educational materials are lacking and need to be developed?
- Mike Adams had shared that the Wisconsin DOT library would be able to perform a literature search and assist in developing and distributing a survey for the group free of charge, so the group agreed to proceed through them for Phase I. The literature search completed by Wisconsin DOT. In general, most information obtained showed heavy use of AASHTO AI/RWIS training. Does this provide what is needed? Can we set up some guidance as to what training would be helpful for AI or RWIS (individually)?
- To date, it has been decided that:
  - A training section will be included under the 'wiki'
  - Include all materials such as power points, hand outs, etc. Each must be dated
  - After materials are collected, answer - "What gaps still exist?"
  - Review TCCC website and Peer Exchange information
  - Each survey respondent will be contacted to see if they are willing to share training materials.

**Approximate % Complete:** 30 %

**Barriers/Issues:** None

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

### **Additional Comments:**

- This project was funded for \$20,000 in FY 2009
- Project Team: Dawn Gustafson (champion), Max Perchanok, Ralph Patterson, Jeff Tilley, Mike Adams

## **Project Status Report**

July 6, 2011

**Project:** 2009-05: Further Development of Pavement Precipitation Accumulation Estimation System

**Champion:** Leigh Jones, Utah Department of Transportation

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**Objective:** The two primary objectives of this project are the utilization of RWIS data within PPAES and the blending of PPAES products produced using different observation platforms.

**Status:**

- **Algorithm Development:** Refinement of the blending of radar and surface precipitation occurrence and rate analyses software.
  - Added functionality to find the effective range of each individual radar for the four cardinal quadrants of each radar.
  - Added a correction step to ensure consistency between radar- and surface observation-estimated precipitation fields. Corresponding analysis values obtained using radar and surface observations are compared and the mean difference between these values, for each radar, is determined. Then, radar- and surface-based analysis fields are corrected such that consistent analyses are produced (e.g., discrete jumps in estimated precipitation rates do not exist at locations where the source of analysis values transitions from radar to surface observations or vice-versa).
- **Validation Activities:** Completed data-denial validation scheme, with performance measures and summary scores for the 20 test cases currently being computed.
- **Challenges Encountered:** When altering the PPAES blending algorithm, efficiently deriving and applying a correction to each individual radar can be challenging.
- **Schedule:**
  - Complete flat terrain testing of the current version of PPAES, including validation (contingency table-based and summary performance metrics) and subsequent refinement based on results of the validation).
  - Begin work on software to handle complex terrain issues. This is a task that will involve multiple quarters of work.

**Approximate % Complete:** 30 %

**Barriers/Issues:** None

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

**Additional Comments:**

- This project was funded for \$83,000 in FY 2009
- Project Team: Leigh Jones (champion), Jack Stickel, Jason Norville, Mike Adams

## **Project Status Report**

May 19, 2011

**Project:** 2010-01: Enhancements of AI/RWIS CBT

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**Champion:** Tina Greenfield, Iowa Department of Transportation

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### **Status:**

- This was the #1 Ranked Peer Exchange Project from 2009.
- Lee Smithson and Tina Greenfield are working to get more money funded for the project.
- Lee Smithson, Steve Lund, and Bill Hoffman presented a resolution (asking permission) at the Summer AASHTO SCOM Meeting this past July in Savannah, to have AASHTO ask State DOT's to Contribute \$3,750 for this CBT enhancement. So far 29 state DOTs have contributed to the fund.
- Tina has reviewed three of the web-ized CBTs.
- GanTek will finish the other operations CBTs before he starts on the AI/RWIS CBT. So far he has finished three of the operations CBTs and has nearly completed a fourth CBT. Various folks in the state DOTs are testing them.

**Approximate % Complete:** 25 %

**Barriers/Issues:** None

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

### **Additional Comments:**

- This project was funded for \$50,000 in FY 2010
- Project Team: Tina Greenfield (champion), Dawn Gustafson, Dean Kernan, Mike Adams, Max Perchanok, Jeff Tilley, Bill Hoffman
- Partners include Clear Roads and AASHTO representatives as well.

## **Project Status Report**

March 10, 2011

**Project:** 2010-02: Mobile-Weather Data Collection Guidelines

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**Champion:** Curt Pape, Minnesota Department of Transportation

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### **Status:**

- Bill Hoffman has suggested teaming up with the AASHTO equipment group.
- This project is just underway.
- This project is a sister project 2010-04.
- The first step will likely be a synthesis.
- Paul Brown, Clear Roads Chair, will be hosting a vendor workshop at the Clear Roads Winter Meeting in Virginia to discuss how the Vendors will begin working with DOTs on Open Architecture and Open Data Platforms. We should get some very good information on how best to create guidelines for Mobile Weather Data Guidelines.
- A mini-meeting may be necessary in Boulder.

**Approximate % Complete:** 10 %

**Barriers/Issues:** None

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

### **Additional Comments:**

- This project was funded for \$25,000 in FY 2010
- Project Team: Curt Pape (champion), Max Perchanok, Dean Kernan, Gabe Guevera, Joe Doherty, Li Fu, Jeff Tilley, Sheldon Drobot

## **Project Status Report**

July 4, 2011

**Project:** 2010-03: Results Based Winter Road Maintenance Standards

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**Champion:** Max Perchanok, Ontario Ministry of Transportation

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### **Status:**

- Time-based Level of Service standards were compared among 5 jurisdictions
- A benefit-cost framework for winter maintenance was developed
- A six-year database was constructed that integrates traffic flow, accident records, weather conditions, road surface conditions and winter maintenance operations at 31 highway sections in Ontario. MTO permanent traffic counters, Ontario Provincial Police accident reports, MTO RWIS and Road Condition Reports, and Environment Canada weather data, for 31 stations on Winter Class I and II highways across Ontario
- Databases on traffic flow and weather conditions at sites in Iowa and Michigan have been obtained.
- Preliminary analyses and models relating accidents, traffic flow and road conditions to road-weather and maintenance have been developed.
  - A statistical model was created that estimates the relative importance of precipitation and visibility conditions, traffic level (maintenance class), and various maintenance operations in determining the road surface condition. The model can also be used to forecast road surface conditions.
  - A preliminary model was developed that relates accident rate to road surface and winter precipitation conditions.
  - A preliminary model was developed that relates traffic flow to road surface and winter precipitation conditions.
  - Alternative Winter Severity Indices were tested against annual salt use in Ontario. The Aurora and the MTO indices track well with salt use in southern areas of Ontario but not in areas with temperatures outside the working range of road salt nor in areas susceptible to freezing rain.
- Road Surface Index (RSI) was adopted as a common measure of road surface condition that relates to visual descriptions reported in MTO's public winter storm road condition reports (RCWIS) and to measured traction levels.
- Automated road condition monitoring systems for winter operations were investigated.
  - Algorithms were developed for classifying snow cover (bare, partial snow, full snow) from mobile or fixed web-cam images, and from continuous friction measuring devices.
  - A framework was developed for comparing the sensitivity, reliability and cost of alternative monitoring systems including web-cams, friction monitoring trailers and devices, multi-spectral cameras and visual reports.

**Approximate % Complete:** 55 %

**Barriers / Issues:** Grad student working on traffic flow model has dropped to part-time.



**Recommendations:**     continue as planned  
                                   continue with modifications  
                                   discontinue

**Additional Comments:**

- This project was funded for \$120,000 in FY 2010
- Research direction currently has a very broad scope. Discussions will be held with UW over the summer to focus work for 2011-12-13.
- Project Team: Max Perchanok (Champion), Dawn Gustafson, Joe Doherty, Sheldon Drobot, Neal Hawkins

## **Project Status Report**

July 4, 2011

**Project:** 2010-04: RWIS Sensor Density Grid

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**Champion:** Max Perchanok, Ontario Ministry of Transportation

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**Status:**

- This project will likely be a continuation of Project 2000-01.

**Approximate % Complete:** 5 %

**Barriers/Issues:** None

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

**Additional Comments:**

- This project was funded for \$100,000 in FY 2010
- Project Team: Max Perchanok (champion), Jack Stickel, Ralph Patterson, Dawn Gustafson, Sheldon Drobot, Mike Adams, Jason Norville, Dean Kernan, Tina Greenfield

## **Project Status Report**

September 22, 2010

**Project:** 2010-05: Determining RPU and Sensor Failure

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**Champion:** Jack Stickel, Alaska Department of Transportation and Public Facilities

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**Status:**

- This project is new for FY 2010.
- The team is scheduling a meeting to coordinate the approach.

**Approximate % Complete:** 5 %

**Barriers/Issues:** None

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

**Additional Comments:**

- This project was funded for \$5,000 in FY 2010
- Project Team: Jack Stickel (champion), Ralph Patterson, Tina Greenfield, Jason Norville, Sheldon Drobot

## **Project Status Report**

August 16, 2011

**Project:** 2011-01: Third Peer Exchange

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**Champion:** Tina Greenfield, Iowa Department of Transportation

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**Background:** Aurora has been actively researching a number of surface transportation weather projects; while Clear Roads is researching materials, equipment, and practices related to winter maintenance operations. Unfortunately, information and research results sometimes do not reach end users in all states or at different agency levels. The winter maintenance community needs to be more aware of the research conducted by Aurora and Clear Roads and other research organizations and take a more active role in requesting research to meet winter operational needs. Therefore, the objective of this project is to conduct a National winter maintenance meeting for Aurora, Clear Roads, SICOP, PNS and the FHWA to share research results from the Peer Exchanges held in 2007 and 2009, get updates from each snow-belt state, and discuss other issues related to winter snow removal operations. Each state will be given the opportunity to send one representative to the meeting and states that have members on the Aurora or Clear Roads boards will be able to send their representative.

**Status:**

- This project is new for FY 2011.
- Lee Smithson has been coordinating the approach.
- A Peer Exchange Planning committee was selected and has met several times in 2010 and 2011.
- The event will be held in September 2011.

**Approximate % Complete:** 95 %

**Barriers/Issues:** None

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

**Additional Comments:**

- This project was funded for \$30,000 in FY 2011.
- Aurora, Clear Roads, PNS, SICOP and FHWA would be equal partners in developing the agenda for the multi-day meeting.
- Project Team: Tina Greenfield (champion), Bill Hoffman, Dawn Gustafson, Dean Kernan

## **Project Status Report**

May 17, 2011

**Project:** 2011-02: RWIS Training Tool

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**Champion:** Tina Greenfield, Iowa Department of Transportation

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**Background:** It is often the case across states and even within states that winter maintenance supervisors or foremen do not have a consistent understanding of RWIS and weather information in real-world decision making. Training may be administered but it is difficult to determine how much is retained, whether understanding was reached, and which parts of the training were successfully integrated into decision making practice. Therefore it is difficult to assess supervisor/foremen competency and it is difficult to tailor training to their needs. This is especially a problem when hiring new staff or hiring contractors because there are few tools to evaluate their ability to perform as required. This project involves the creation of a supervisor evaluation tool which can measure a supervisor's ability to incorporate RWIS and risk management into their decision making process.

**Status:**

- This project is new for FY 2011.
- This project is estimated to last 3 years.
- A draft scope/concept drawing was sent to the team for review. Tina needs their comments so we can get the project going.

**Approximate % Complete:** 5 %

**Barriers/Issues:** None

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

**Additional Comments:**

- This project was funded for \$200,000 in FY 2011.
- Project Team: Tina Greenfield (champion), Bill Hoffman, Max Perchanok, Sheldon Drobot, Jack Stickel, Mike Adams

## **Project Status Report**

October 29, 2010

**Project:** 2011-03: Benefit/Costs and Instruction for Migrating to Open RWIS

**Champion:** Tina Greenfield, Iowa Department of Transportation

**Background:** The objective of this project is to create a do-it-yourself guide for RWIS sensors, servers, data bases, web displays, etc. This project concept could possibly be added as an extension to the 2009-03 Wiki database project.

**Status:**

- This project is new for FY 2011.

**Approximate % Complete:** 5 %

**Barriers/Issues:** None

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

**Additional Comments:**

- This project was funded for \$75,000 in FY 2011.
- Project Team: Tina Greenfield (champion), Dawn Gustafson, Jason Norville, Jack Stickel, Mike Kisse

## **Project Status Report**

October 29, 2010

**Project:** 2011-04: Study of MDSS Costs

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**Champion:** Mike Adams, Wisconsin Department of Transportation

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**Background:** This project concept was presented as a concern at the 2009 Peer Exchange and ranked at #9 among those ideas. The objective of this effort is to determine the upfront costs vs. long-term benefits for implementing MDSS systems. Also, determine necessary equipment, how to best equip the trucks, and quantify secondary benefits of equipping the fleet for MDSS. Initially this project will require a survey of the states. Aurora will team up with Clear Roads and MDSS Pooled Fund to realize this project's goals.

**Status:**

- This project is new for FY 2011.
- This project was funded for \$20,000.

**Approximate % Complete:** 5 %

**Barriers/Issues:** None

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

**Additional Comments:**

- This project was funded for \$20,000 in FY 2011.
- Project Team: Mike Adams (champion), Mike Kisse, Jason Norville, Sheldon Drobot

## **Project Status Report**

October 29, 2010

**Project:** 2011-05: Funding Sources Identification

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**Champion:** Jack Stickel, Alaska Department of Transportation and Public Facilities

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**Background:** Road weather management programs and Road Weather Information Systems (RWIS) can tap into various federal funding sources. This includes standard funding allocations and grant allocations. These sources are not well known to all agencies. This project will compile potential funding sources and approaches that state department of transportation agencies can tap to fund the road weather management program. This would include funding partnerships, grants, standard allocations, and shared cost opportunities.

**Status:**

- This project is new for FY 2011.
- This project was funded for \$5,000.
- This will involve surveying the Aurora member agencies on the funding sources they use, how to tap into them, and the processes they use to secure the funding
- The resulting document would be posted on the Knowledge Base web site.

**Approximate % Complete:** 5 %

**Barriers/Issues:** None

**Recommendations:**  continue as planned  
 continue with modifications  
 discontinue

**Additional Comments:**

- This project was funded for \$5,000 in FY 2011.
- Project Team: Jack Stickel (champion), Joe Doherty, Bill Hoffman, Jason Norville, Lee Smithson